

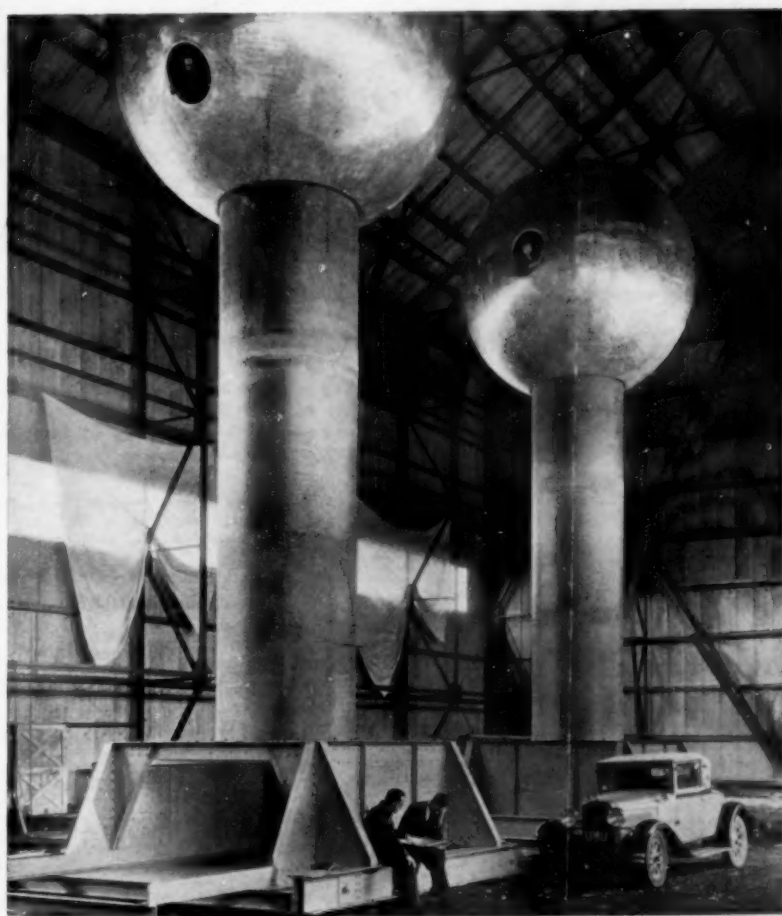
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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



JANUARY 14, 1933

New Atom Smashing Machine

See Page 26

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VOL. XXIII

No. 614

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Summary ofCurrent
Science

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DO YOU KNOW THAT

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New York State reports that in 1932, for the first time in years, its cancer death rate did not increase.

Study of beautiful snow crystals shows that the higher the air in which the crystals are formed, the simpler and plainer are the patterns.

A stone head of Buddha, acquired by the Cleveland Museum of Art, is reported to have come from Angkor Wat, the famous ruins of ninth century Cambodian glory.

A mysterious driftwood of unknown origin has been found in the Philippines, and has aroused interest because it has but half the weight of balsa, lightest wood in commercial use.

A dairy specialist says that cream from pasteurized milk may look thinner than unheated cream because the butter fat does not clump, but in reality the heated cream is just as rich in butter fat.

The history of the Rhode Island Greening apple is traced back to a seedling that stood in a tavern yard near Newport about 1700.

Peiping has a new museum called the Fan Memorial Institute of Biology, which, it is hoped, will become the "Smithsonian" of China.

The Chinese practice of footbinding for girl children is said by some to have started about 1100 B.C., when China had a club-footed Empress.

Apple trees that were artificially lighted yielded fewer wormy apples, from which scientists concluded that light tends to deter codling moths from egg-laying.

The student health service at the University of Michigan has figured the odds on chances of catching cold, finding that out of every 1,000 persons, 926 will catch one cold a year.

WITH THE SCIENCES THIS WEEK

Curiosity arousing questions for the teacher and general reader. Book references in italic type are not sources of information of the article, but are references for further reading. Books cited can be supplied by Librarian, Science Service, at publisher's price, prepaid in U. S.

ARCHAEOLOGY

How far below the present level is London's main street of the first century? p. 20.

BACTERIOLOGY

May cold germs at times be harmless? p. 25.

BIOLOGY

How many sheep were killed by bitter rub-berweed during the past two winters? p. 25.

BOTANY

Can chlorophyll work without living matter? p. 20. *The Green Leaf*—D. T. MacDougal—Appleton, 1930, \$2.

CHEMISTRY

How much hay is lost in the United States each year in fires started by spontaneous ignition? p. 26.

ECOLOGY

Has vegetation of the north recovered from the last ice age? p. 23. *Plant Sociology*—J. Braun-Blanquet, trans. by George D. Fuller and Henry S. Conard—McGraw-Hill, 1932, \$4.50.

In what two months do snakes grow fastest? p. 25.

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What are "adenomata"? p. 24.

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How many dollars per day will be saved with aluminum tank trucks? p. 21.

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What becomes of the arsenic an insect eats? p. 24.

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For whom was "God Chingchinich" a deity? p. 29.

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Is unemployment insurable? p. 24.

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May malaria be acquired by a chicken? p. 25.

NATURAL RESOURCES

How long will coal and oil last? p. 19. *Conservation of our natural resources*—Loomis Havemeyer—Macmillan, 1930, \$4.

PHYSICS-ARCHAEOLOGY

How was King Tut's purple gold colored? p. 30.

PHYSICS

What gas may when excited produce the northern lights? p. 19.

Where will men be safely subject to 10,000,000 volts? p. 26.

PUBLIC HEALTH

Has the weather of the past few years been favorable to health? p. 22.

Where is the influenza epidemic still strong? p. 25.

SOCIAL SCIENCE

How much land in the country has been damaged by erosion? p. 27.

STATISTICS

In what country does the average person live longer than 64½ years? p. 22.

ZOOLOGY

What is "ectogenesis"? p. 31.

NATURAL RESOURCES

Waste of Metals, Coal and Oil May Starve Machine Age

Consumption Increased Thousand Fold in Past 100 Years Prompts Prediction of Exhaustion Almost Immediately

THE MACHINE AGE may starve to death in the almost immediate future, victim of today's profligate use of metals, coal and oil.

To the scientists and engineers of the American Association for the Advancement of Science, Prof. Ross Aiken Gortner, University of Minnesota biochemist, observed that precious, irreplaceable stores of natural resources absolutely essential to modern industrial civilization are disappearing into the maws of industry and dissipated wastefully.

"In the last hundred years this lusty infant, applied science, has increased its food consumption perhaps a thousand fold," he said, "and unfortunately for mankind already the shelves in some of nature's cupboard show signs of exhaustion of specific food supplies."

While the publicity of technocracy calls attention to the part played by mechanical energy in remaking economic conditions, Prof. Gortner warns that the coal and oil supplying this energy will be exhausted within the next thousand years, which is but a second in the history of mankind.

More menacing is the approaching exhaustion of copper, antimony, tin, lead, zinc, chromium, manganese, nickel and iron stored in parts of the earth accessible to man.

These metals will probably be exhausted in less than one thousand years if used at their present rates of consumption, Prof. Gortner estimated. And the rate of use of some of them is doubling each decade.

In the past hundred years the tools of science have wrested from the earth from a tenth to half of the available natural resources. Man has enjoyed them for a moment, then destroyed them or cast them aside in a form useless to coming generations.

"In spite of the fact that the world's resources of tin are exceedingly limited, we still demand tinfoil around candy bars and packages of cigarettes," Prof. Gortner charged, "and the world's available sulfur supply is being rapidly ex-

hausted in the demand for cellulose products that have a silken sheen."

Iron will be exhausted at present mining rates in the following times: Germany, 40 to 50 years; Scandinavia, 100 years; United States, 100 years; Russia, 150 years; all the mines of the world, 250 years.

Copper, zinc, lead and tin will have been exhausted long before the iron is gone. America's supply of elemental sulfur will fail in fifteen years.

At present rate of consumption the coal of England will last about 50 years, that of France less than 300 years, that of Belgium less than 800 (*Turn Page*)

PHYSICS

Artist Paints Spectra of Light in Upper Atmosphere

CHARLES BITTINGER, Washington artist-physicist, (right, in accompanying photograph) has painted the spectra of the lights that shine in the upper atmosphere of the earth and sun. Dr. E. O. Hulbert, physicist at the Naval Research Laboratory, Bellevue, D. C.

(left) collaborated with Mr. Bittinger.

The upper spread of colored spectral lines in the picture is that of the aurora that occurs in the upper air of the earth. Next are portrayed the bands of nitrogen as seen at the negative poles of a discharge tube, showing a close relationship to those of the aurora and supporting the idea that the northern lights are due largely to excited nitrogen.

The moonless night sky as seen through a spectroscope is next shown and next to the bottom is the spectrum of a meteor, based on information just obtained by Harvard College Observatory. The lower spectrum is that of the beautiful corona that is seen surrounding the sun only during total eclipse.

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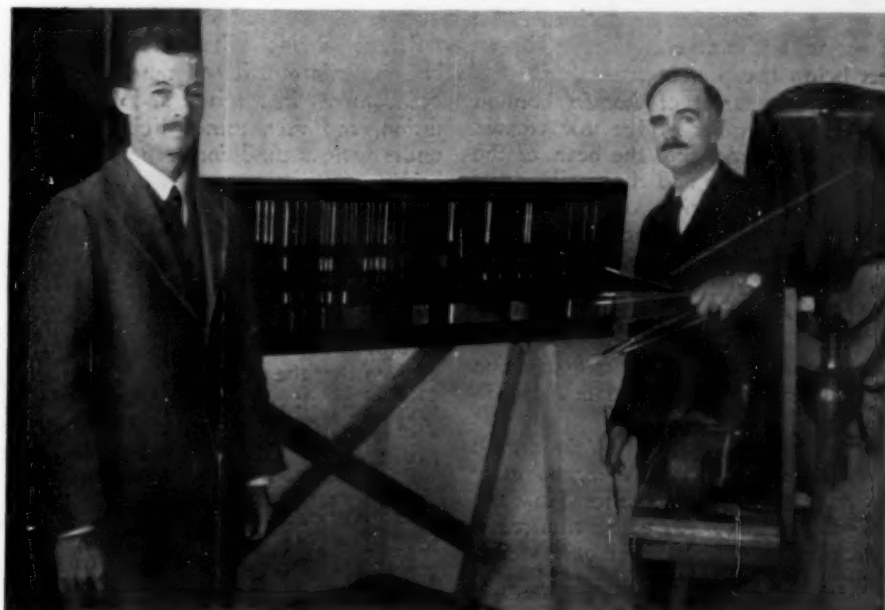
ENTOMOLOGY

Caterpillars Hear Sounds Audible to Man

CATERPILLARS can hear. They hear sounds audible to human ears. This was reported to the meeting of the American Society of Zoologists by Dr. D. E. Minnich of the University of Minnesota.

He held tuning-forks of several pitches within the range of the middle piano keyboard over a sound box in which were caterpillars of fourteen different species. When he struck the forks the caterpillars served notice that they heard, either by stopping their movements or by vigorously contracting their longitudinal muscles.

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RAINBOWS OF THE UPPER ATMOSPHERE OF EARTH AND SUN

years, that of Germany less than 1000 years and that of the United States, including our vast lignite deposits, less than 1500 years. Petroleum will have vanished many years earlier.

Water power, alcohol from vegetation, and solar energy are totally inadequate to replace oil and coal.

Even if natural resources last twice or three times as long as predicted, Prof. Gortner feels that the applied science of the white man may have raised up a Frankenstein which will ultimately destroy him, if the scientists of the future do not solve these problems which appear to us insoluble.

"Will future civilizations look back upon the industrial civilization of the twentieth century not as an age of progress but rather as an age of despoliation," Prof. Gortner asked, "as today we look back upon the Tartars and the Vandals and the Huns who destroyed the civilizations of Greece and Rome? Will the wheel of time turn man backward to a more primitive and isolated existence, with the horse and the wooden sail-boat again his only means of transportation?"

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ARCHAEOLOGY

London's Main Street Of First Century Found

WORKMEN digging foundations for a building have discovered the "Main Street" of London of Roman days.

The Roman road, believed to have been London's most important thoroughfare in the first centuries of the Christian era, was encountered sixteen feet below the present street level.

The main street of Roman London ran from a timber bridge that crossed the River Thames into the heart of the city to the Forum and the Basilica that was the administrative center of the entire province. From there the road continued north out of the city, where it joined the great Roman road leading to the north of England.

The road dated from the time when London was rebuilt after its destruction by the rebelling British queen, Boadicea, in 60 A. D.

Traffic from the coast of Britain must have tramped over this thoroughfare for more than three centuries. How frequently the road had to be repaired is shown by layer upon layer of gravel to a depth of eight feet. The road is 30 feet wide.

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BOTANY

Secrets of Energy Source Sought in Chlorophyll Study

WHILE TECHNOCRATS sounded the trumpets of a new economic-industrial revolution based on energy uses and physicists debated the nature and source of the still-mysterious cosmic radiation at the American Association for the Advancement of Science, botanists told of equally intense though less-heralded efforts toward the understanding of chlorophyll, the world's greatest means of capturing radiant energy of the sun.

Chlorophyll, the stuff that makes plants green, was certainly the key to coal production in the distant past, probably the key to oil production as well, and will have to supply fuel for Diesel engines after the coal beds and oil wells are emptied. The intense concern of plant scientists with chlorophyll is therefore not to be wondered at.

At the meeting of the American Association for the Advancement of Science, several scientists reported advances in the understanding of this world-distributed but still little known substance, chlorophyll. Prof. O. L. Inman, of Antioch College, told of experiments that show the action of chlorophyll to be independent of the presence of actually living matter. He ground up green clover leaves to a fine pulp, filtered the mixture through close-meshed cloth to remove all living cells and leave nothing but the chlorophyll and the once-living cell contents in a mixed and fluid condition, and then turned light upon it, under various conditions of temperature, acidity, etc.

Luminous Bacteria Detectors

Luminous bacteria, that shine when oxygen strikes them, were used as sensitive detectors of chemical activity of the chlorophyll mixture. Their shining showed that the mixture, though certainly dead by all common criteria, was still able to work with light to produce the raw materials of food and fuel.

Prof. G. Richard Burns, of the Vermont Agricultural Experiment Station, told of testing the ability of two evergreen trees, Norway spruce and white pine, to use special colors of light. The darker half of the red end of the sun's

spectrum, part of the blue and all of the violet at the other end, were useless to these trees, but all the rest of the light was grist for the chlorophyll's mill. He also found by careful energy measurements that the plants follow closely the predictions of Einstein's photochemical equivalence law in their energy absorption during the conversion of carbon dioxide and water into plant material and oxygen.

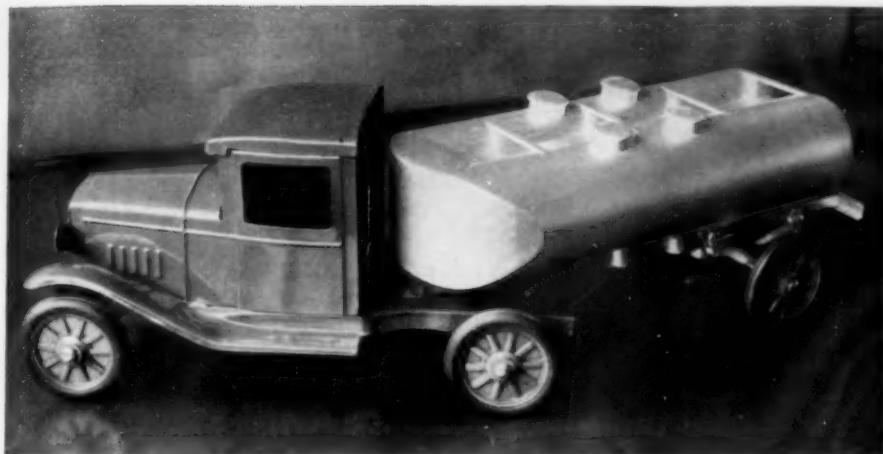
At a demonstration booth in the Association's exhibition hall, Dr. E. S. Johnston and Dr. F. S. Brackett of the Smithsonian Institution showed one of the methods of attack on the problem being employed in their laboratory. They have set up a large glass tube with living plants growing inside it. The light they need is supplied in exactly measurable quantities from artificial sources, and the atmosphere, which may be either natural air or any mixture of gases desired, is passed in and out by tubes, being measured and analyzed as it passes. In this way a close check-up of the plant's life processes is made possible.

Corn Production Speeded

Chlorophyll speeds the production of corn in proportion to its concentration in the leaves, reported Dr. Howard B. Sprague of Rutgers University, who worked with various inbred strains and hybrids. And the more chlorophyll the whole plant had, the more it produced of both grain and stalk.

Major attacks upon the chlorophyll problem are being conducted at the Fixed Nitrogen Laboratory of the U. S. Department of Agriculture, at the Smithsonian Institution, at Harvard University, at Antioch College under the auspices of the C. F. Kettering Foundation for the Study of Chlorophyll and Photosynthesis, and at the University of Munich as well as in numerous other educational institutions and experiment stations. Each group of research workers is digging into some special part of the field, and meetings like those of the American Association for the Advancement of Science give them opportunity to meet and compare notes.

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LIGHTER TRUCK TO CARRY MORE GAS: A MODEL.

HEREDITY

Scientists Measure Size of Genes Without Seeing Them

THE UNIT of heredity known as the gene, that controls physical characteristics and passes them on from generation to generation in man and other living things, has been measured.

Its largest size is one quintillionth of a cubic centimeter. This is just about the volume that fifteen protein molecules, one of the largest organic chemical aggregations, could crowd into.

This determination of the size limits of the bearers of heredity, announced to the American Association for the Advancement of Science by Drs. John W. Gowen and E. H. Gay, of the Rockefeller Institute for Medical Research, is considered an important fundamental step in the development of biology.

Genes are the units within the chromosomes which determine the development of physical characteristics when, through the union of male and female germ cells, a new individual is created. Chromosomes can be seen readily with the microscope, but the single gene is probably too small to be seen by the eye even when aided by the most powerful optical means. The gene is as important to biology as molecules and atoms are to the physical sciences.

"We postulate the existence of the gene because of the properties it gives to aggregates of other matter," Drs. Gowen and Gay explained. "Size is a fundamental structural characteristic. The measurement of size, even though it may be crude, has, if we may judge

by our sister sciences, always led to further progress."

The Rockefeller scientists based their discovery of the gene's size upon the discovery made several years ago that X-rays smashing into genes will change the bodily characteristics that they transmit. They used the *drosophila* fruit flies that have been experimented upon to contribute so much to the new knowledge of heredity obtained since the turn of the century. Pure X-rays specially produced were used to bring about the changes, or mutations, in genes. Thousands of flies were used in the experiments. The magnitude of the average gene was found by dividing the amount of chromatin, or material in the chromosome, by the number of genes estimated by the mutations observed.

The total number of genes in any one cell was shown to be not less than 14,380. This corresponded to a largest gene size expressed numerically in cubic centimeters as one-tenth multiplied by itself eighteen times. In attempting to visualize this extremely small volume, one quintillionth of a cubic centimeter, it may be helpful to remember that a centimeter is a little more than a third of an inch.

These gene size determinations check approximately with those reported several months ago by Prof. Oswald Blackwood, of the University of Pittsburgh.

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ENGINEERING

Airship Engineers Design New Gasoline Tank Truck

FROM THE SAME factory that has produced the navy's giant airships there will soon be issuing a new kind of gasoline trailer truck made of light weight aluminum and designed for safety.

By using the skilled engineers and workmen who are now completing the airship Macon, the Goodyear-Zeppelin Corporation plans to make it possible for auto trucks to transport more gasoline and oil over highways and still not violate the regulations that highway officials enforce to prevent unduly heavy trucks damaging roads.

The new aluminum semi-trailer unit for gasoline consists of three cylindrical tanks with a low center of gravity. These not only carry the gasoline but also support the load as beams. Made of aluminum that weighs only 37 per cent. as much as the usual steel, engineers estimate that the new tank combination will save 19 per cent. of the hauling cost, an economy of about \$15 a day.

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MEDICINE

Serum-Virus Mixture Protects From Paralysis

CONSIDERABLE protection against infantile paralysis in monkeys was obtained by a properly balanced mixture of living causative virus and serum from the blood of recovered patients, Dr. Maurice Brodie of McGill University reported to the Society of American Bacteriologists.

The mixtures were given either combined after incubation at body temperature or separately. The amount of serum must be no more than just enough to protect the animals against paralysis.

Dr. Brodie was investigating the relation between the power of the virus to produce disease and the resulting protection given by skin injections of small doses of it. Previous workers had shown inconstant and unreliable results with virus weakened by heat or germicides. So Dr. Brodie decided to use living virus that had a low disease-producing potency. He found that the protection obtained by injection of such virus was directly proportional to the disease-producing potency of the virus.

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PUBLIC HEALTH

Good Health of Old Year To Continue Into 1933

But Guess is Hazardous, Says Authority Citing Dependence On Weather, Public Health Services and Research

By DR. LOUIS I. DUBLIN, Past president of the American Public Health Association and Third Vice President and Statistician for Metropolitan Life Insurance Company.

THE YEAR 1932 has closed with the best health record in our history. There is no sign of any untoward circumstance which would indicate an early change in the situation. However, it is at best a very hazardous undertaking to say how next year will turn out.

An outbreak of virulent influenza is entirely possible at any time and that might change the entire complexion of the mortality of 1933. Health authorities have expected such an outbreak this year in view of the past history of influenza. It has fortunately not developed. But in some instances these epidemic outbreaks do register after a delay of some months, and that is something to keep in mind for 1933.

The meteorological conditions will also play a very important part in the health picture of next year. These last few years have been extraordinarily favorable in that regard. I have no idea whatever as to what the weather conditions will be in the future.

Much will also depend on the continued efficiency of the Federal, State and municipal health services. If the present tendency to curtail budgets continues or is accelerated, there should be a very decided reflection in the death-rates from certain of the infectious diseases. It would be the worst possible economy for communities to endanger their vital resources through parsimony with health expenditures.

Certain advances in medical science make it very dangerous to predict recurrence of epidemic diseases on the basis of past performance. This is especially true of diphtheria. This disease has been declining very remarkably because of the widespread immunization of children with either toxoid or toxin-antitoxin. The effect of this practice has been completely to modify the cyclical outbreak of the disease.

In the past, diphtheria, like measles, whooping cough and scarlet fever, has recurred in fairly well-defined cycles. The peaks in the death-rate have occurred with much regularity at intervals of about seven years. Measles, whooping cough and diphtheria have had secondary peaks every three or four years. Influenza has shown a peak in the death-rate every three years since 1920, that is, in 1923, 1926 and 1929. Nineteen thirty-two has, however, passed without any serious outbreak. This may have been merely deferred for some months and may occur in 1933. Pneumonia, closely related to influenza, is expected to follow about the same course or cycle as influenza. So far this year the very lowest pneumonia mortality ever recorded has been observed.

The continued drop in tuberculosis mortality in 1932 was particularly striking and the most unexpected of all favorable items in the mortality picture. It can only be explained by the fact that community facilities, including hospitalization and the feeding and shelter of the unemployed have been continued on a very effective basis. If these are continued, there is no reason to expect an increase in tuberculosis deaths, especially since it appears that the forces at work

in the community over the last 25 years have established a sufficient momentum to more than offset the unfavorable effects of the depression.

I do not believe that we have reached the peak in the cancer death-rate which will probably continue to rise in 1933. Very large increases in the cancer mortality were recorded in the last two years among industrial policyholders. On the other hand, the cancer death-rates for a group of cities showed a slightly lower rate in 1931 than 1930. It is difficult to understand why there should be this difference in the situation as between wage earners, on the one hand, and the general population, on the other. It will be very interesting to see what the figures for 1932 in the general population show.

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STATISTICS

70-Year Life Expectancy Foreseen For Americans

THE AVERAGE American of the future may confidently expect to live out the Biblical three-score-and-ten years, predicted Drs. Louis I. Dublin and Alfred J. Lotka of the Metropolitan Life Insurance Company in a discussion before the American Association for the Advancement of Science.

Some years ago, when the actual average length of life was about 57 years, Dr. Dublin estimated that ultimately this figure would be 64.75 years. Since then this hypothetical figure has actually been exceeded in New Zealand. Dr. Dublin does not see any reason why Americans may not exceed in due course the figure achieved ten years ago by New Zealanders. (Next Page)

PSYCHOLOGY

People Learn Faster When Not Punished For Mistakes

IF DAD STARTS to take you to the woodshed for not learning your lessons, just cite to him the lesson taught by psychological tests reported to the American Association for the Advancement of Science by Dr. Milton B. Jensen of Quenemo, Kansas. He found that punishment interferes with the operation of mental powers and is a handicap to scholastic accomplishment.

Dr. Jensen tested eleven men and

eleven women, who were blindfolded, with a device that gave them a painful electric shock every time their fingers took the wrong turn in a maze of tacks. Then he tried the same test on a similar group who were not shocked but politely informed of their mistakes. The persons tested by electricity made 58 per cent. more errors and they required 34 per cent. more trials to learn.

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The American baby of the future, moreover, may have an expectation of living to be 70 years old in the light of present knowledge, and not as a result of any "radical innovations or phantastic evolutionary change in our physiological make-up, such as we have no competent reason to assume," Dr. Dublin pointed out.

Some of the factors that will increase the life expectancy are probable continued reduction in tuberculosis deaths, reduction in infant deaths as a result of better prenatal care of the mother, and even reduction in cancer deaths which should result with the present knowledge of the disease.

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SEISMOLOGY

Epicenter of Alaskan Quake Located in Mountains

THE ALASKAN earthquake reported as having shaken the city of Seward had its epicenter some distance from the place, in the mountains north of the Kenai peninsula, according to calculations based by scientists of the U. S. Coast and Geodetic Survey on seismological reports gathered by Science Service from American and Canadian observatories. The approximate location of the point of greatest disturbance was in 62 degrees north latitude, 148 degrees west longitude, and the time of origin was four-tenths of a second before eleven o'clock, eastern standard time, on the night of Tuesday, Jan. 3.

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ECOLOGY

Studies Show Alaskan Forest Is Marching Into Arctic

Forest Front is Made Up of Young Trees While Few Miles To Rear Three-Century-Old Specimens Abound

THE FOREST of Alaska is marching northward. Its front is made of young trees, none of them over a hundred years old, though a few miles to the rear there are plenty of specimens that can boast three centuries.

This and other evidence of advancing tree line in the North was presented before the Ecological Society of America by Prof. Robert F. Griggs of the George Washington University. His observations in Alaska are supported by similar studies made by other botanists in the Scandinavian countries.

Prof. Griggs' most striking observations were made at Kodiak, which is now just beyond the timbered area, though old records indicate that areas now heavily forested were treeless a few generations ago.

"The trees at the edge of the forest are small and squat, suggesting an adverse climate," he said, "but when examined they were found to be growing as rapidly as the same species a thousand miles within its borders to the southeastward. They are likewise reproducing freely.

"The marginal trees are small because they are young. None of the trees within a mile of the forest border at Kodiak is more than a hundred years old. There are no fallen logs nor other remains of trees older than the present generation. Many trees now standing in thick forest have large dead branches clear to the ground and evidently began life in the open. Three miles back from the forest border the trees are more than three hundred years old and have attained great size. Dead trees and fallen logs are present as in ordinary forests.

"Instead of being held in check by climatic factors this forest is rapidly migrating into new territory . . .

Not Recovered From Ice Age

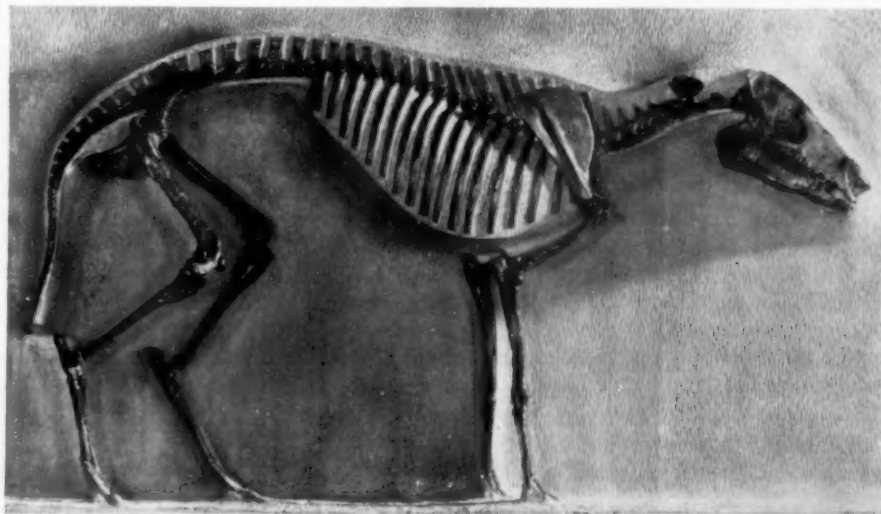
"The forest migration thus demonstrated is taken to be a continuance of the readjustment since the last glaciation. It suggests that the vegetation of boreal and north temperate regions generally may not yet have fully recovered from the last glacial period."

Additional support for the theory that the Alaskan forest is migrating northward is offered by microscopic examination of peat from a bog near Kodiak, collected by Prof. Griggs and analyzed by his associate, Dr. Paul W. Bowman.

The bog is thirteen feet deep, and situated several miles within the edge of the spruce forest and surrounded by well-grown trees. The upper three feet of this deposit were too soupy to permit the collection of material for analysis, but below this level core-cuttings were made all the way to the bottom.

Microscopic analysis of this material showed great numbers of spores, but they all belonged to several species of ferns, with exceedingly few pollen grains from trees. This is taken to indicate that when the lower ten feet of peat were being formed, the bog stood in open country with ferns dominating the vegetation, and that the forest has moved in and taken possession of the land since that time.

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THE HORSE THAT RAN LIKE A DOG

The whippet-like outline of this skeleton could easily fool one unversed in anatomy into guessing the animal to be a dog. But it is an *Eohippus*, the earliest and smallest of known fossil horses, recently mounted for the American Museum of Natural History.

BOTANY

Great Botanical Collection Presented to Field Museum

MORE THAN 51,000 botanical specimens, collected by the late Prof. John M. Coulter of the University of Chicago, have been presented to the Field Museum of Natural History.

This collection is of unique value in the history of science in the West, for it contains many "type" specimens from western states, that is, the first specimens of their kind ever collected, from which species have been named and which constitute the final criteria for the identification of plants collected at later times.

Prof. Coulter was one of the pioneers of botany in the West. He was official botanist of the first organized scientific expedition into the Yellowstone Park region, which explored the area in 1872. His interest in western botany began with that date. His book on the flora of the Rocky Mountains, as revised by Prof. Aven Nelson of the University of Wyoming, is still the standard reference book on the plants of that region.

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ENDOCRINOLOGY

Tumors in Gland Cause Increased Functioning

THE TUMORS in the pituitary gland, called "adenomata," were pointed out as possible causes of abnormal functioning of the otherwise healthy gland, by Prof. Harvey Cushing of Harvard University, in a discussion before the American Association for the Advancement of Science.

The pituitary gland is a small body situated underneath the brain, functioning by discharging its secretions into the blood stream. It is one of the most important of the ductless glands, for one of its secretions controls the rate of body growth, and another has to do with the normal functioning of the reproductive system. If the gland is injured or congenitally deficient, the luckless individual may remain a dwarf or else fail of normal sexual development, depending on what region of the gland is affected. On the other hand, abnormally high functioning of the pituitary may cause gigantism or severe physiological disorders connected with the reproductive system.

One of the riddles of glandular physiology has been the occurrence of abnor-

mal individuals who nevertheless have apparently normal pituitary glands. Prof. Cushing pointed out that these tumors, the adenomata, once thought to be abnormal but functionless, are really the seat of intense secretion in the early stages of the tumors' growth. The abnormal cases with seemingly normal pituitaries may therefore have adenomata concealed within them. It is also possible, Prof. Cushing pointed out further, for pituitaries otherwise diseased to have concealed adenomata as well, thus adding to their unfortunate owners' afflictions.

Science News Letter, January 14, 1933

ENTOMOLOGY

Radium Traces Arsenic Eaten by Insects

WHEN AN INSECT eats a bit of leaf poisoned with arsenic, every tissue in its body gets a share of the toxic dose. This was determined by Dr. David E. Fink of the bureau of entomology, U. S. Department of Agriculture, in an ingenious experiment involving the use of radium. Dr. Fink reported his research to the Entomological Society of America.

The problem which Dr. Fink set for himself was to trace the course and final destination of lead arsenate in the insect's body. He mixed with the poison a solution of radium D, which has a strong affinity for lead and goes with that metal wherever it travels. To an experimental lot of insects he fed a meal of leaves covered with this radium-treated poison.

After twenty-four hours he killed the insects and sliced their bodies into microscopically thin sections. These he laid on the surface of a photographic negative and left in the dark-room for several days. Radiations from radium D affect photographic plates, so that the slices of insect took their own pictures.

A critical examination of the radium photographs failed to show any places to which the poison had failed to penetrate. There were some spots where the concentration seemed to be higher, but all of the body tissues had at least some of the radium, and hence some of the lead and arsenic.

Another exceedingly delicate test method gave as one of its end results the economically important information that an arsenic-fed insect gets nine-tenths of the poison out of its body and retains only one-tenth.

Science News Letter, January 14, 1933

IN SCIENCE

MATHEMATICS

Actuaries Cannot Figure Unemployment Risks

THERE is grave doubt whether the risk of unemployment is a suitable hazard for actuarially sound insurance, Prof. H. L. Rietz, University of Iowa mathematician, told the American Association for the Advancement of Science.

Schemes for unemployment insurance that involve governmental subsidies or governmental participation would have to be undertaken at the present time practically in the dark rather than in the light so far as appropriate actuarial estimates are concerned, Prof. Rietz said.

Experimental plans, whether fostered by trade unions, joint agreements, companies, or other agencies should be encouraged, Prof. Rietz said, to keep records appropriate for making calculations of rates of unemployment in order that estimates of future costs may be improved over those of the past.

Science News Letter, January 14, 1933

ZOOLOGY

Feeding Pig Spleen Gives Trout Cataract

PIG SPLEEN is bad meat for young trout. It ruins their eyes.

This in ten words is the gist of experiments reported to the American Society of Zoologists by Prof. Walter N. Hess of Hamilton College.

Trout reared under artificial conditions have always given a good deal of trouble by developing cataract. Nobody knew why. Prof. Hess undertook to find out. He kept a large number of young trout in several separate enclosures, under varying conditions of light, some in company with trout already cataract-afflicted, to see whether the trouble was contagious, others on different dietary regimes. All of the young trout did well except the groups to which pig spleen was fed in their meat ration. Of these, more than 17 per cent. developed cataract. It was concluded that the malady was due to the improper food.

Science News Letter, January 14, 1933

IN FIELDS

MEDICINE

Chickens and Monkeys May Be Malaria Reservoirs

A CHANCE mosquito bite of a chicken or a monkey may be an unsuspected source of malarial infection. Studies showing that chickens may be infected by certain strains of malaria were reported by Prof. Reginald D. Manwell of Syracuse University to the American Association for the Advancement of Science.

Up to now scientists have not known generally that such large birds as chickens could get malaria. This is because the disease runs a short, mild course in the barnyard bird and so is not recognized, Prof. Manwell found. His discovery that chickens could be infected resulted from efforts to find a more suitable bird than the canary for his studies of the disease.

Since chickens can be infected artificially, Prof. Manwell questioned whether they and other animals hitherto supposed to be not susceptible to malaria may not also be infected in nature. In that case they would serve as unrecognized reservoir hosts, their blood containing enough malarial parasites to infect other mosquitoes but not enough for detection by ordinary microscopical methods.

"It is quite conceivable that monkeys or other mammals might in this way contribute to the perpetuation and spread of human malaria," he concluded.

Science News Letter, January 14, 1933

ECOLOGY

Snakes Earmarked By Clipping of Tail Scales

HOW WOULD YOU mark a snake so that when you met it again you could recognize it?

Many persons probably would answer that they would not want to meet a snake even once, let alone a second time; but Dr. Frank N. Blanchard of the University of Michigan and Ethel Finister of the Asheville Normal School are interested in snakes, not afraid of them.

At the meeting of the Ecological Society of America they described their method of ear-marking, or rather tail-marking, snakes by clipping off portions of scales on the undersides of their tails, and recording these marks systematically. Thus, 2-4, 7, represents a snake with the second tail-scale on the left and the fourth and seventh on the right clipped.

The clipped scales tend to grow again, but for several years an identifying scar can be made out. Thus it becomes easy to identify a snake that has been captured and released.

Although their study has been going on for a comparatively short time, the two biologists were able to report that male and female snakes show no sex-correlated differences in growth rate, that they grow more slowly as they get older, and that snake growth goes on fastest during June and July.

Science News Letter, January 14, 1933

BACTERIOLOGY

Cold Germs Play Dual Role In Persons They Infect

THE GERMS that cause colds in the head are harmless at certain times even if they reach a human being in food, water or air. At other times they grow "bad" and cause illness and sniffles. This is a popular explanation of a new theory advanced by Dr. E. C. Rosenow of the Mayo Clinic.

Colds and other respiratory diseases occur when germs belonging to the ever-present streptococcus group acquire peculiar virulence and other properties. Contact with persons suffering from colds is not of prime importance in the spread of this or other respiratory ills. Evidence supporting these theories has been obtained in studies of streptococci from throats, raw milk, flies, and water during epidemics of colds.

In these studies Dr. Rosenow used his newly-developed method of identifying peculiar properties of disease organisms by their electric charges. In this way he found streptococci of the same charges and disease-producing potency for animals in the throats of persons suffering from the usual colds and allied ailments of early autumn, from the raw milk and water supplied, and from flies.

The isolation from water of streptococci like those found in epidemics of colds may explain the reduction in the amount of colds and other respiratory diseases observed when water supplies are purified.

Science News Letter, January 14, 1933

PUBLIC HEALTH

Predicted Flu Decrease Already Seen in Reports

A LARGE DECREASE in influenza cases throughout the country was reported to the U. S. Public Health Service for the week ending December 31. This bears out the prediction of the health authorities that the end of the major outbreak would be reached by the last of January. With all but three states heard from, the total for the week is 86,624. The total for the previous week was 123,138.

Four New England states, Maine, Massachusetts, Rhode Island and Connecticut, reported increases. Other increases were reported in New York City, New Jersey, Maryland, Ohio, West Virginia, the Carolinas, and Montana.

Iowa reported a big increase, but this state's high total of 3,436 cases for Dec. 31 was only an estimate of the total number of cases in the state and not the total actually reported.

High totals continue to be reported in Kentucky, Tennessee, Alabama and Arkansas, and in the Northwest, Montana and North Dakota reported high totals. Western states, where the epidemic was first felt, are now reporting much less prevalence of the disease.

Science News Letter, January 14, 1933

BIOLOGY

Starving Sheep Killed By Poisonous Weed

BITTER rubberweed, a plant belonging to the aster family, has been growing into a serious problem to sheep raisers in a part of western Texas. A. B. Clawson, physiologist of the Bureau of Animal Industry, told biologists in Washington. Due apparently to overuse of the grazing land and to climatic factors, the weed has been increasing in abundance while good forage plants have been growing scarcer, with the result that the poor sheep have been driven to this poisonous food. It is estimated that 75,000 of them died in an area of 6,000 square miles during the winters of 1929-30 and 1930-31.

The cause of sheep losses was not at first known, but because of the abundance of the bitter rubberweed in the affected area it was placed under suspicion, and an investigation resulted in its conviction. The plant is known to botanists as *Actinea odorata*.

Science News Letter, January 14, 1933

PHYSICS

New Type Atom-Smashing Generator Nears Completion

THE NEW TYPE electrostatic high voltage generator being constructed by the Massachusetts Institute of Technology at Round Hill, Mass., with a Research Corporation grant, will be in operation in a few weeks. Dr. R. J. Van de Graaff, its inventor, President Karl T. Compton of Massachusetts Institute of Technology and Dr. L. C. Van Atta so informed the American Physical Society.

It will develop a steady direct current potential of 10,000,000 volts with a continuous power output of about 20,000 watts. One of the first tasks of the generator will be atom-smashing.

To provide a portable high voltage machine, Dr. Van de Graaff and E. H. Bramhall have designed a rugged ma-

chine mounted on rubber tired casters that will develop 1,500,000 volts.

Both generators work on the principle of the old-fashioned static electricity generator and belts carry the electric charges to large discharging spheres.

The size of the giant electrostatic generator is apparent from the photograph taken where the apparatus is being assembled in an airship dock. The spherical aluminum electrodes are 15 feet in diameter and weigh one and one-half tons each.

The interior of each sphere will be a compact laboratory, and, though the circular cells are to be subject to high voltages, they will be the safest places for the scientists while the machine is in operation.

Science News Letter, January 14, 1933

See Front Cover

CHEMISTRY

Oxygen-Hungry Gases Held To be Cause of Haystack Fires

WHY HAYSTACKS sometimes catch fire through spontaneous ignition was explained to chemists attending the American Association for the Advancement of Science by Dr. C. A. Browne of the bureau of chemistry and soils, U. S. Department of Agriculture.

Hay losses from this cause in the United States run into big money; approximately \$20,000,000 a year, Dr. Browne said. This is enough to endow a big university or build a couple of first-class cruisers. Research that may eventuate in the repeal of this unauthorized tax is therefore judged very much worth conducting.

Many chemists for many years have observed, experimented and speculated over the question of how a haystack can make itself hot enough to catch fire. A part of the answer was easy enough, once it was demonstrated that the life processes of plants generate heat no less than do those of animals. The digestive ferments in half-cured hay will raise its temperature appreciably; but even more important than this is the fermentive ac-

tion of bacteria and other microorganisms, which carry on the process to an even higher temperature.

Nevertheless the major part of the riddle remained unsolved, for the highest temperatures attainable by living bacteria are still many degrees short of the ignition temperature of hay. Bacteria alone can make hay hot, but they cannot set it afire. They are killed by their own self-generated heat before the hay even chars, let alone bursts into flame.

The puzzling temperature gap can be bridged, Dr. Browne is convinced, by examining the decomposition products given off by the action of the bacteria on the hay. The first thing that happens is the conversion of part of the starches and celluloses into sugar, which then proceeds to ferment. Buried deep in the haystack, without access to the outside air, the fermentation takes place under oxygen-deficient conditions and does not proceed to the normal end-point. Instead of the complete chemical breakdown into carbon dioxide and water, the fermenting process produces complex gases

rich in carbon and hydrogen but lacking in oxygen. At the same time the surrounding layer of hay acts as a heat insulator, driving the temperature higher.

The gases generated by the imperfect fermentation have an avid hunger for oxygen. If a little reaches them, they absorb it eagerly, generating still more heat. If they are kept blanketed in until a large supply of air suddenly has access to them, they are very apt to react with the oxygen so energetically as to produce actual flame.

Science News Letter, January 14, 1933

BOTANY

Mosses' Lowly Cousins Give Shelter to Fungus

COMPANIONSHIP, apparently on a basis of mutual help, between two lowly members of the plant world was reported before the Botanical Society of America by Sister Mary Ellen O'Hanlon of Rosary College, River Forest, Ill. She has found fungi growing within the bodies of liverworts, which are relatives of the mosses, but a rung or two lower on the evolutionary ladder.

Eight different species of liverworts were found to be harboring the fungus growth. Although it invaded their tissues quite freely, it appeared to do them no harm. Sister Mary Ellen conjectured that by helping to conserve moisture for its sheltering host, the fungus growth paid for the nourishment it got. It would thus be a case of "mutualism" rather than of parasitism.

Science News Letter, January 14, 1933



The Science Service radio address next week will be on the subject

HOUSEHOLD HEALTH HAZARDS

by

Dr. Yandell Henderson

Professor of Applied Physiology, Yale University

FRIDAY, JAN. 20

at 12:45 P. M., Eastern Standard Time

Over Stations of The Columbia Broadcasting System

SOCIAL SCIENCE

Social Inventions are Needed To Keep Pace With Science

President's Committee Declares for Stimulation of Social Sciences Without Limiting Mechanical Invention

DECLARING that social invention must be stimulated to keep pace with mechanical invention, but declaring emphatic opposition to any moratorium upon research in physical science and invention, a massive factual inquiry by President Hoover's research committee on social trends has just been issued.

Begun in September, 1929, the inquiry was conducted by hundreds of specialists in 29 fields ranging from population to government and society. Dr. Wesley C. Mitchell of New York was chairman and Dr. William F. Ogburn of the University of Chicago was director of research. Two volumes totaling 1700 pages now published by the McGraw-Hill Book Company will be followed by 13 volumes of special studies and supporting data. Rockefeller Foundation funds, not government support, financed the study.

The report lays great stress on the changes that have occurred in our civilization as the result of scientific discoveries and inventions.

Indispensable prerequisites of "a successful, long time constructive integration of social effort" are listed as:

"Willingness and determination to undertake important integral changes in the reorganization of social life, including the economic and the political orders rather than the pursuance of a policy of drift.

"Recognition of the role which science must play in such a reorganization of life.

Intimate Interrelationships

"Continuing recognition of the intimate interrelationship between changing scientific techniques, varying social interests and institutions, modes of social education and action and broad social purposes.

"Specific ways and means of procedure for continuing research and for the formulation of concrete policies as well as for the successful administration of the lines of action indicated."

First scientific and technologic devel-

opments instigate changes in economic habits and social habits most closely associated with them, such as factories, cities, corporations and labor organizations.

Then the family, government, schools and churches are affected. Somewhat later come changes in social philosophies and codes of behavior, although at times these may precede the others.

Epoch-Making Events

The report observes that the first third of the twentieth century has been filled with epoch-making events and crowded with problems of great variety and complexity. A few of these are:

"The World War, the inflation and deflation of agriculture and business, our emergence as a creditor nation, the spectacular increase in efficiency and productivity and the tragic spread of unemployment and business distress, the experiment of prohibition, birth control, race riots, stoppage of immigration, women's suffrage, the struggles of the Progressive and the Farmer Labor parties, governmental corruption, crime and racketeering, the sprawl of great cities, the decadence of rural government, the birth of the League of Nations, the expansion of education, the rise and weakening of organized labor, the growth of spectacular fortunes, the advance of medical science, the emphasis on sports and recreation, the renewed interest in child welfare."

With such events have come national problems urgently demanding attention and some of these points of tension are:

"Imperialism, peace or war, international relations, urbanism, trusts and mergers, crime and its prevention, taxation, social insurance, the plight of agriculture, foreign and domestic markets, governmental regulation of industry, shifting moral standards, new leadership in business and government, the status of womankind, labor, child training, mental hygiene, the future of democracy and capitalism, the reorganization of our governmental units, the use of leisure

time, public and private medicine, better homes and standards of living."

"Demagogues, statesmen, savants and propagandists have attacked these problems, but usually from the point of view of some limited interest," the report says.

The committee declares that it does not exaggerate the bewildering confusion of problems but merely uncovers the situation as it is.

"Modern life is everywhere complicated," the report states, "but especially so in the United States, where immigration from many lands, rapid mobility within the country itself, the lack of established classes or castes to act as a brake on social changes, the tendency to seize upon new types of machines, rich natural resources and vast driving power, have hurried us dizzily away from the days of the frontier into a whirl of modernism which almost passes belief."

Many striking statements and findings are contained in the report of President Hoover's research committee on social trends just issued. A few follow:

Church and family have lost many of their regulatory influences over behavior, while industry and government have assumed a larger degree of control.

We have the anomalies of prohibition and easy divorce; strict censorship and risqué plays and literature; scientific research and laws forbidding the teaching of the theory of evolution; contraceptive information legally outlawed but widely utilized.

Modern civilization rests upon power, upon energy derived from inorganic rather than human or animal sources.

Technical Gains Lost

Growing difficulties of mining in England have swallowed up the gains of technology and the output per worker in the coal mines is less than it was fifty years ago.

From the public point of view it is important that any change in economic organization undertaken in the interest of steadier profits and wages should also insure conservation by preventing waste of the resources.

As far as the energy resources are concerned, the heart of the conservation problem lies in preventing waste of coal, petroleum and natural gas.

About one-fourth of the cultivated land in the United States, chiefly in the southeast and southwest, has lost by erosion a third of its surface soil, and that from another quarter of the land a

sixth or more of surface soil has been removed.

There has been no increase in crop acreage for 15 years, nor in acre-yields of the crops as a whole for 30 years, yet agricultural production has increased about 50 per cent. since the beginning of the century.

The rate of population growth in the United States has long been declining but this fact has perhaps been obscured because of the size of the net increase decade by decade.

We shall probably attain a population between 145 and 190 million during the present century with the probability that the actual population will be nearer the lower figure than the higher.

A new type of population grouping is appearing: not the city, but the metropolitan community—a constellation of smaller groups dominated by a metropolitan center.

The motor age has brought "boom" suburban towns planted with as little planning as the "boom" towns which burst into existence in the railway age.

Men often commit criminal acts because of social conditions.

Crime fluctuates with the business cycle.

New chemical knowledge on the regulation, growth and functioning of the hormones may have astounding effects on personality and the quality of the population.

No End to Invention

More and more inventions are made every year, and there is no reason to think that technological developments will ever stop.

The world may find much use for talking books.

The production of artificial climate may become widespread.

An efficient storage battery of light weight and low cost might produce changes rivaling those of the internal combustion engine.

Opening channels of communication tends to produce uniformities of speech, manners, styles, behavior and thought; but this tendency is counteracted in part by the increasing specializations arising from the accumulation of inventions which bring to us different vocabularies, techniques, habits and thoughts.

Those who are acquainted with past experience anticipate that, while business will revive and prosperity return, the new wave of prosperity will be termin-

ated in its turn by a fresh recession, which will run into another period of depression, more or less severe.

Is it beyond the range of men's capacity some day to take the enhancement of social welfare as seriously as our generation took the winning of a war?

In the two years following 1929, the aggregate money earnings paid to American employees fell about 35 per cent. while the cost of living declined 15 per cent.

Unsuspected Merits

Not only is the housewife solicited to buy for two dollars down and a dollar a month a dozen attractive articles her mother never dreamed of; she is also told of unsuspected merits in products she has used all her life, which now come in new packages under seductive brands.

Our emphasis upon making money is re-enforced by the technical difficulties of spending money.

The population of three-fifths of the states remains more than half rural and by 1950 perhaps nearly half the states will still be more than one-half rural.

Women are employed in some 527 occupations; but they tend to concentrate in a few callings, for about 85 per cent. of the employed women are in 24 different occupations.

It has been said that some homes are merely "parking places" for parents and children who spend their active hours elsewhere.

About half of the nation's families live in rented homes.

Of the children of high school age, about 50 per cent. are now in school—evidence of the most successful single effort which government in the United States has ever put forth.

With shorter hours of labor a program of education for adults may be developed and become widespread, although at present the great enemy to adult education is the competition of amusements.

The church is legally separated from the state; it is not formally in politics, but it has taken interest in such problems as those of the family, marriage and divorce, the prohibition of the sale of intoxicating drinks, capital and labor relationships, crime, and many local community questions.

A comparison of the census records of 1920 and 1930 shows in general that artists of various kinds are increasing

more rapidly than the general population.

Recent trends show the United States alternating between isolation and independence, between sharply marked economic nationalism and notable international initiative in cooperation, moving in a highly unstable and zigzag course.

The tax bill of all the governments in the country in 1930 was ten and a quarter billion dollars, perhaps 15 per cent. of the incomes of the people. We spend about the same amount of money or more on recreation, approximately one-seventh as much on tobacco, and perhaps about one-fifteenth as much on cosmetics.

The almost omnipotent legislative authority set up at the outset of our national development has steadily lost to the courts on the one side and the executive on the other; and this process has gone on more rapidly than ever during recent years.

Shall business men become actual rulers; or shall rulers become industrialists; or shall labor and science rule the older rulers?

Science News Letter, January 14, 1933

ETHNOLOGY

Indians' "Hot Dog" Magic Conjures Up North Wind

AFTER A THAW comes in the late winter, up in the Big Woods of northern Canada, the Cree Indians of James Bay always want the north wind to blow, because then a crust will form on the snow, hampering the movements of the big game animals and making them easier to capture.

To conjure up a north wind they have many magics, says Dr. John M. Cooper, anthropologist of the Catholic University of America. Here are three of the many. The simplest consists in going out and swinging "bull-roarers" and other devices to make a loud, wind-simulating noise. A second magic, reputedly effective, is to strip all the clothes off a small boy and then send him forth naked to defy, like a young Ajax, not the thunderbolts of Zeus but the breath of Boreas.

But their third magic is the most spectacular, though admittedly a bit rough on the dog. The Indians carefully prepare a bunch of birch-bark ribbons, tie it to the tail of a dog, and then set fire to it!

Science News Letter, January 14, 1933

Remedies for baldness are among the formulas of ancient Egypt.

ENGINEERING

Largest Ship to Recoup Loss of France's Atlantique

WHEN the Normandie puts to sea, the French merchant marine will more than recapture its position lost by the tragic burning of the Atlantique, world's twelfth largest steamship.

The Normandie is the largest vessel in the world, clearly exceeding the Leviathan and the Majestic in both tonnage and length. She was launched during the past fall at St. Nazaire to be put in transatlantic service in 1934. (SNL, Dec. 24, '32, p. 407).

France now has only one vessel larger than the Atlantique, that is, the Ile de France of 43,153 registered tons, tenth largest steamship, according to Lloyds. It is exceeded in both tonnage and length by the following ships given in order of diminishing size: Leviathan, U. S.; Majestic and Berengaria, British; Bremen, German; Rex, Italian; Europa, German; Olympic, British; Conte di Savoia, Italian, and Acquitania, British.

The Atlantique was not as familiar to North Americans as are other ships of comparable size because she had never been to this country. She was built for South American trade and had been in service about a year. Names of practically all the other first dozen or so largest vessels are well known in this country because they designate vessels plying the North Atlantic.

The Normandie has an overall length of 1027 feet, 963 feet between perpendiculars, and will be rated at approximately 75,000 gross tons. The Leviathan's registered tonnage is approximately 60,000, more than the Majestic's 56,000, but her length between perpendiculars is only 907 feet 6 inches compared with 915 feet 5 inches for the Majestic.

The Normandie's breadth of 119 feet 6 inches accounts chiefly for her greater tonnage. The vessel is a little more than 19 feet wider than either the Leviathan or the Majestic.

In addition to excessive size, the Normandie will contain the largest electric motors ever built. Rated at 40,000 horsepower each, the new motors will give the vessel a total horsepower of 160,000; but even then she will not be the most powerful ship. The U. S. airplane carriers Saratoga and Lexington bear this title with 180,000 horsepower

plants in each. Each contains eight motors rated at 22,500 horsepower, connected in pairs to four propelling shafts.

The Normandie's claim to fame would probably not be so clear cut had work on the new British Cunard liner R-534 continued. But, because of economic conditions, construction was suspended almost a year ago on this vessel which, it was announced, would be rated at 73,000 tons and would have a length of 1,018 feet.

The Normandie's hull is divided into 12 water-tight compartments. There are eleven decks, five of which are continuous from stem to stern. Accommodation will be provided for 930 first class, 680 tourist and 560 third class passengers which, with 1,320 officers and men, will allow the ship to carry 3,490 persons.

The turbo-electric machinery has been designed for a service speed of 30 knots to enable the vessel to cross the Atlantic from Havre to New York by way of Plymouth under all conditions in less than five days.

Science News Letter, January 14, 1933

ETHNOLOGY

California Indians Had Tradition of Redeemer

INDIAN TRIBES of California long ago had a tradition of an Indian Redeemer, a savior and teacher who founded a faith that spread to all the tribes of the southern California coast. This is the finding of John P. Harrington, ethnologist of the Bureau of American Ethnology. Traditions of the Indian Redeemer have become so vague and so old that Mr. Harrington has been able to recover only broken glimpses into their significance.

The Indian Redeemer was the "God Chinigchinich." He was born of humble parents in an Indian village in what is now Los Angeles County. In his teens he astonished wise men of the village by his teachings. One day, in the presence of a vast assembly, he announced that he should be called Chinigchinich, and that he would teach ceremonies for curing the sick, obtaining food for the hungry, and overcoming evil. (Turn Page)

Seven Famous Scientists Are Ready To Talk With You

1. Dr. Robert A. Millikan, on *The Rise of Physics*
2. Dr. William H. Welch, on *The Tubercle Baccillus*
3. Dr. John C. Merriam, on *The Record of the Rocks*
4. Dr. Edwin G. Conklin, on *The Mystery of Life*
5. Dr. Karl T. Compton, on *Science and Engineering*
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Those who did not follow Chinichinch's teachings were avenged, he told. He said: "Him who obeyeth me not, I will send bears to bite him, rattlesnakes to sting him, sickness, calamities, and death."

Indian traditions say that this Indian god is still alive and existing. He is chief of the Happy Hunting Grounds and Captain of the Dead. Mr. Harrington hopes to recover more details of this mysterious Indian teacher and his influence.

Science News Letter, January 14, 1933

ARCHAEOLOGY

Skeleton Guards Relieved Of Duty at Monte Alban

SKELETONS that have guarded Tomb 14, Monte Alban, for centuries have at last been relieved of their duty.

Mexican archaeologists exploring the cemetery of the ancient Mexican city have entered Tombs 13 and 14. Above the latter they found two guardian skeletons buried. Inside the small flat-roofed stone chamber was the skeleton of the Indian whose attendants lay overhead.

In another part of Monte Alban, the excavators have been exploring the interior of the Southwestern Pyramid which stands on the North Platform. They have found a large debris-filled room inside the pyramid. Vestiges of stucco indicate that the room was once painted red. This red room, long hidden under the pyramid shell, is pronounced by the archaeologists to be the temple room of a smaller and older place of worship.

Science News Letter, January 14, 1933

Michigan scientists find that the grit cells in pears vary greatly with different varieties.

PHYSICS-ARCHAEOLOGY

Modern Laboratory Duplicates King Tut's Purple Gold

BEAUTIFUL purple surface films on golden sequins found in the tomb of Tut-Ankh-Amen have been proved to be due to the presence of iron in the gold, by Prof. R. W. Wood of the Johns Hopkins University. Prof. Wood reported on his examination of these ancient ornaments before the American Association for the Advancement of Science.

The sequins have been the subject of much discussion ever since they were first discovered. Some scientists have claimed that the Egyptians knew an art for coloring gold surface purple, while others have believed that the purple sheen was a kind of patina due to the great age of the ornaments. Prof. Wood, using the methods of a physicist, has shown the color to be due merely to the presence of iron in gold which has been first hammered and then heated. He even made duplicates of the sequins by hammering out a gold-iron alloy into the thin flakes and heating the latter over a flame. One of his modern purple-gold sequins has been sent to the Cairo Museum, to be displayed along with the originals.

A modern beauty aid helped in the solution of the riddle of the purple film. Prof. Wood found he could remove the film by coating the gold ornaments with celluloid varnish such as is used in fingernail polish, and then peeling off the varnish, leaving the underlying gold of a bright yellow color. There was no

sign of the film on the peeled-off varnish layer, but the film could be made to reappear by redepositing gold on the side to which the film was attached by vaporizing gold in a vacuum. Then the purple could again be seen by reflected light. The problem in physical optics presented by this phenomenon is still under examination, Prof. Wood stated.

Subjected to spectroscopic examination, the stripped-off film proved to be principally iron, probably an iron oxide. Prof. Wood then suspended one of the sequins from which the purple film had been removed between the poles of a strong electromagnet. It was attracted toward one of the poles, demonstrating the presence of iron in the gold.

Etching the surface of the gold with acid showed a very marked crystalline structure, such as is found only when rolled or hammered sheet gold is subsequently heated to nearly a red heat. Microscopic examination showed on the surface numerous small globules of gold standing out in high relief, conclusive evidence that the sequins had been heated to a high temperature after having been hammered into shape. It was after having learned these facts that Prof. Wood took gold and iron and duplicated the product of the "lost art" of the ancient Egyptian court jewelers.

The microscopic globules Prof. Wood believes to be due to melting of the gold out of a gold-orpiment mixture experimentally tried by the Egyptian artist. Orpiment is a bright yellow arsenic-sulfur compound known to the Egyptians and used by them in tomb wall decorations. Lumps of it were found in Tut-Ankh-Amen's tomb, some of which Prof. Wood received from the Cairo authorities.

Melting gold with this orpiment, and rolling the resulting bead out into a plate, Prof. Wood heated it over a flame and obtained gold globules exactly like those on the sequins. He also hammered out small nuggets of California gold, which had been in his family since '49, and on heating the resulting plates he again obtained the globules. No purple film appeared, however, for the California gold is free from iron.

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An Ancient Aristocracy

THE OLD BYWORD "as crazy as a cockroach," is not nearly so old as the cockroach family. As a matter of fact, if primogeniture counts for anything, the cockroach outranks all living insect families except the dragon-flies, for he was here on earth when coal was in the making. Fossil cockroaches have been found in the coal measures, differing little if at all from their modern descendants. Contemporaneous with these early roaches was a most curious insect with six wings, which must be regarded as the great-granddaddy of all insects so far as we have any records. This hexapterous ancestor has long since been gathered to his fathers—whatever they were—but his eldest offspring, the dragon-flies and the cockroaches, still survive.

It may occur to some, who know the cockroach only as an annoying domestic pest, to wonder how these insects got along way back in the hundred-thousandth millenium before kitchen sinks and drain-pipes; but even today the majority of cockroaches are forest dwellers. There are a great many species of them, and they are found almost "from Greenland's icy mountains to Patagonia land." Almost all the wild species are winged, though they do not fly very much.

It is hard to understand why the cockroach should be considered so repugnant an animal, while the ant, which is even a worse pest, suffers no particular stigma. Contrary to popular belief, the cockroach is a cleanly insect, both in feeding habits and in the care of its personal appearances. Its presence does not necessarily indicate slack house-keeping, but merely the misfortune of a damp cellar.

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ZOOLOGY

Rabbit and Rat Embryos Are Grown in Laboratory

RECENT scientific romances, especially in England, have visioned a future human society in which babies will be produced in glass vessels in the laboratory. There is no prospect whatever of the practical realization of this process of "ectogenesis," as it was called, but something like initial stages of it in lower animals was reported from three different laboratories at the meeting of the American Society of Zoologists.

Dr. A. J. Waterman of Brooklyn College removed young rabbit embryos in extremely early stages of development from the bodies of their mothers, and planted them upon suitably prepared artificial media. This artificial food material was not even from rabbits, but partly from chickens and partly from rats. The young embryos lived for several days, and advanced several stages in their bodily development.

Drs. J. S. Nicholas and D. Rudnick of Yale University transplanted rat

embryos of from five to twelve days' development onto the embryonic membranes in incubating eggs, thus making the developing chicks, even before hatching, a sort of foster-parents of the alien animals. The younger the rat embryos the poorer the success of the grafts, but enough of the older ones "took hold" to make the experiment a success. Notable in these grafts was the normally rapid development of the nervous system.

Dr. Margaret R. Murray of Columbia University, made tissue cultures of rat skull bones taken from embryos in the fourteenth to sixteenth days of prenatal development. In the rat, the hardening of these bones usually begins with the seventeenth day. This ossification occurred in the bones growing in the laboratory glassware just as though they had still been attached to their original embryo bodies within the mother.

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PSYCHOLOGY

Babies Behind Glass Plate Tested to Learn Behavior

WHAT DOES your baby do if he can't get what he wants to get, or can't go where he wants to go? Does he "get mad and quit," or actively and persistently set about solving the disagreeable situation?

The emotional type of a very young child, as well as his physical activity and his mental keenness, can be determined scientifically by purposely putting him in such a situation and then seeing what he does about it. Such a test was described to the American Association for the Advancement of Science by Miss Elizabeth DuBose Price, of the Normal Child Development Clinic of the New York Babies' Hospital.

Miss Price puts the baby to be tested into an inclosure, one side of which consists of a strong glass plate. Outside of the plate she puts a toy or something else that the baby will want, or

she leaves a door open, offering the youngster a chance to "run away," which any parent will testify is a favorite pastime with children. The plate is low enough for a creeping infant to reach over and get the toy; low enough also so that a toddler able to stand can climb over it. Then she leaves the situation up to the baby.

Some of the babies, she has found, successfully work out the problem for themselves without emotional fuss. Others become so wrought up that they cannot control their movements, and so are left baffled. And some become so engrossed in getting over the barrier that they forget what they are doing it for, and have to be reminded. One infant was so intent on running away that it deliberately fell over the low glass wall, although falling is a rather terrible experience for such young children.

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• First Glances at New Books

Genetics

THE MECHANISM OF CREATIVE EVOLUTION—C. C. Hurst—*Macmillan*, 365 p., \$6. A sumptuously gotten up book presenting the principles of genetics in a style which the educated lay reader can understand, yet without robbing the subject of meat worthy a student's teeth. The author challenges mankind to take charge of evolution by the handle presented by the Mendelian principles.

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Social Science

RECENT SOCIAL TRENDS IN THE UNITED STATES—Report of the President's Research Committee on Social Trends—*McGraw Hill*, 1700 p., \$10. See p. 27. This is one of the most important fact gathering efforts in social references. It is "must" for reading and reference for those who wish to understand our nation's situation today.

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Engineering

SAFETY FOR THE HOUSEHOLD—U. S. Bureau of Standards—*Govt. Print. Off.*, 102 p., 15c. Describing the more common and more serious hazards likely to exist in and about the home, and telling how to protect life and property from such dangers.

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Geology

GEOLOGY—W. H. Emmons, G. A. Thiel, C. R. Stauffer and I. S. Allison—*McGraw-Hill*, 514 p., \$4. This text is devoted almost entirely to a consideration of the geologic processes, and confines its discussion of historic geology to a comparatively brief section near the end. It is designed particularly for beginning students.

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Zoology

THE MAMMALS OF MINNESOTA—Thaddeus Surber—*Minnesota Div. of Game and Fish*, St. Paul, 84 p. A brief but comprehensive account of the mammals of a state that still has enough wild land to give them a good home. Dr. Thomas S. Roberts adds a chapter on the vanished mammals of Minnesota.

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Psychology

OUR CHILDREN—Edited by Dorothy Canfield Fisher and Sidonie Matsner Gruenberg—*Viking*, 348 p., \$2.75. A

handbook for parents prepared by the Child Study Association of America. Each chapter is written by a specialist on the subject, the authors including Anderson, Gesell, Arlitt, Popenoe, McCollum, Adolph Meyer, and many other authorities.

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Archaeology

THE VILLAGE OF THE GREAT KIVAS ON THE ZUNI RESERVATION, NEW MEXICO—Frank H. H. Roberts, Jr. *Govt. Print. Off.*, 197 p., 64 pl., 50c. Describes the excavation of an eleventh century pueblo built by groups of Indians migrating from two different regions. The report is comprehensive. Several plates showing pottery are in color. A valuable feature is the introductory chapter in which Dr. Roberts rehearses the early story of the Southwestern peoples.

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Botany

FERNS OF FLORIDA—John Kunkel Small—*Science Press*, 237 p., \$3. Florida presents a wealth of plant life, a wealth that is, to a newcomer at least, most baffling. Because of the great climatic range in its 500 miles of peninsular length, and the amazing endemic patches it has here and there, the floristics of the state are even yet only at a beginning. It is encouraging to have this thorough-going book on one special plant group, by a leading authority on Southern botany.

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Chemistry

BOOK OF CHEMICAL LABELS—Robert A. Haag, \$1. Printed gummed labels, recommended by the Committee on Labels of the Division of Chemical Education of the American Chemical Society, bound in convenient book form for laboratory use.

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Engineering

ENGINEERING, A CAREER, A Culture, *Engineering Foundation*, (reviewed SNL, Dec. 31, '32, p. 424). Cost, 15 cents for single copies.

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Geography

THE DISCOVERY OF THE ANCIENT WORLD—Harry E. Burton—*Harvard University Press*, 130 p., \$1.50. How the world gradually came to be known through voyages of trade, colonization, occasionally exploration, and through expeditions of war, is told in this history of ancient geography. The story ends with the geographic ideas of Ptolemy, second century geographer, whose reputation as an authority lasted even to the days of Columbus. The bibliography is excellent.

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Psychology

HABITS: THEIR MAKING AND UNMAKING—Knight Dunlap—*Liveright*, 326 p., \$3. As a donkey can sometimes best be driven to Cork by heading him toward Dublin, so evil habits can be unlearned by practicing them—"negative practice," the author calls the process in this readable exposition of a modern theory of learning and forgetting. By the same token, we can remember matters by attempting to forget them, and we can learn one thing by practicing something else. Dr. Dunlap says in the preface: "I suppose that my treatment of the psychology of learning will seem to many readers to be radical, even revolutionary. It will be found that I have discarded the conventional formulations and flouted the 'principles of learning' set forth in widely used texts. The revolutionary features, however, are merely the result of attempting to harmonize and interpret the products of the experimental work of many psychologists; and the revolt is directed only against the theories and the traditions which originated before the experimental era of psychology, and which need to be swept away in order that the experimental results may be understood." The book is not technical. You will enjoy reading it. You will also enjoy the new type of bibliography prepared by Dr. Willis C. Beasley which includes a brief discussion of each item and its bearing on the text.

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